

Amendments to the Specification:

1. Please replace the paragraph starting at line 27 of page 4 with the following rewritten paragraph:

A1

--Figs. 3A and 3B show scaling algorithms for making the one-half scaled frames and one-quarter scaled frames; and --

2. Please replace the paragraph starting at line 29 of page 4 with the following rewritten paragraph:

A2

-- Figs 4A and 4B show two steps of the motion detection algorithm; and [[.]]--

3. Please add the following paragraph after the paragraph starting with "Figs. 4A and 4B.....", at line 29 on page 4:

A3

-- Fig. 5 shows the steps for obtaining motion vectors.—

4. Please add the following paragraph after the paragraph starting with "one preferred motion ..." at line 12, on page 5:

A4

-- STEP 0: Generate one-half scaled and one-fourth scaled frames.--

DETAILED ACTION

Response to Amendment

This Office Action is in response to Applicant's Amendment dated March 11, 2004 in response to USPTO Office Action dated November 10, 2003.

The cancellation of claims 2 and 5 has been noted.

The amendment to claim 6 has overcome the objection to the claim.

The amendment to the Figures 3A-3B and the addition of Figure 5 has overcome the objection to the Figures.

In regards to applicant's response to the rejection of claim 1 under 35 U.S.C. § 102(b) as being anticipated by Kondo. The applicant states that Kondo does not teach the limitations of claim 1. Applicant specifically states that the macroblock is well known to be of size 16x16. Kondo does not state the size of a macroblock. US Patent 6,560,371 to Song et al. teaches the macroblock can be any size from one pixel to a full frame (Col 3 Lines 64-67 and Col 4 Lines 1-3). Song further teaches in Figure 3, an equivalent hierarchical pixel reduction to Kondo (Kondo, Figs. 9A-C). The figure clearly shows the third stage (Song, 330 and Kondo Fig. 9C) contains one block (Song, 331) that is produced from four blocks (Song, 312a-d and Kondo Fig. 9A). It would have been obvious to one of ordinary skill in the art at the time of the invention that a macroblock can be any size from one pixel to a full frame. It would have been obvious to one of ordinary skill in the art at the time of the invention that the third stage performs a search using four macroblocks.

The response to the rejection of claims 3, 4 and 12 by the applicant is overcome by the clarification of a macroblock stated above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 6, 7, 8, 9, 10, and 11 rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,576,772 to Kondo in view of US Patent 6,560,371 to Song et al.

[claim 1]

Kondo describes a method of finding motion vectors for use in MPEG video encoding, the method comprising:

Generating from a full frame (Fig 9A), (i) a first scaled frame (Fig. 9B) having a reduced number of pixels as compared to the full frame and (ii) a second scaled frame (Fig. 9C) having a reduced number of pixels as compared to the first scaled frame;

Performing a first, full, best match search of the second scaled frame to identify rough motion vectors (Col. 8 Lines 27-57, Col. 9 Lines 50-51);

Performing a second best match search using the rough motion vectors identified by the first search, within a limited range in the x and y directions for each macroblock of the first scaled frame to identify intermediate motion vectors (Col. 10 Lines 9-37, Fig. 10B); and

Performing a third best match search using the intermediate motion vectors identified by the second search within a limited range in the X and Y directions for each macroblock of the full frame to identify final motion vectors (Col.10 Lines 41-67, Fig. 10C).

Kondo does not specifically teach the size of a macroblock. Song teaches the macroblock can be any size from one pixel to a full frame (Col 3 Lines 64-67 and Col 4 Lines 1-3). Song further teaches in Figure 3, an equivalent hierarchical pixel reduction to Kondo (Kondo, Figs. 9A-C). The figure clearly shows the third stage (Song, 330 and Kondo Fig. 9C) contains one block (Song, 331) that is produced from four blocks (Song, 312a-d and Kondo Fig. 9A). It would have been obvious to one of ordinary skill in the art at the time of the invention that a macroblock can be any size from one pixel to a full frame. It would have been obvious to one of ordinary skill in the art at the time of the invention that the third stage performs a search using four macroblocks.

[claim 6]

The scaled frames for the reference frame are produced after obtaining the reference frame from an inverse discrete cosine transform (Col 11 Lines 32-36, Fig 1 and 11A)

[claims 7 and 8]

Kondo describes the limited range of the second and third search is $-1, 0, +1$ pixels (blocks) (Col 10 Lines 8-67, Figs 10B-10E).

[claim 9]

Kondo suggests an optional addition to the motion vector detector that provides one half-pixel accuracy rather than one pixel accuracy. Kondo also suggests that the hierarchical stages consist of any number of stages greater than 2 (Col 16 Lines 10-14). [claims 10 and 11]

Kondo describes the method as recited in claim 1 wherein the first scaled frame is a one-half scaled frame having one-fourth of the number of pixels as a full frame and the second scaled frame is a one-fourth scaled frame having one sixteenth of the number of pixels of a full frame (Col 8 Lines 13-16, Fig 9A-9C, Fig 10A-10C).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo and Song in view of US Patent 5,485,210 to Lim et al.

Kondo and Song teach the use of the method as required by claim 1. Kondo does not teach the use of identifying a scene change and obtaining a new reference frame. Lim teaches using the same block matching technique used for determining the motion vector to also determine a scene change (Col 1 Lines 65-67, Col 2 Lines 1-16, Col 4 Lines 65-67, Col 5 Lines 1-13). The scene change detection causes a the original image to be sent rather than the residual. It is well known in the art that when an original image is sent the image is considered to be an I frame in the MPEG format. It would be obvious to one skilled in the art at the time of the invention to combine Kondo's method of finding motion vectors with Lim's scene change detector in order to be able to use the same block matching technique for both finding motion vectors and determining scene changes.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo and Song in view of US Patent 6,430,222 to Okada.

Kondo and Song teach the use of the method as required by claim 1. Kondo does not teach the identification of a still frame which can be deleted. Okada teaches the method of skipping the coding of macroblocks that have little difference from that of the previous frame Col 8 Lines 40-50). It would be obvious to one skilled in the art at the time of the invention to combine Kondo's method of finding motion vectors with Okada's method of skipping redundant frames in order to reduce the encoding of unnecessary video information.

Claim 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo.
[claim 12]

Kondo and Song teach the use of the method as required by claim 1. Kondo does not specifically point out that the full frame is an I frame. It is well known in the art that when encoding in MPEG format an I frame is used as a reference frame for encoding P and B frames. It would be obvious to one skilled in the art at the time of the invention that an I frame would be used as the full frame in order to produce the needed reference frames for encoding the P and B frames.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent 5731850 to Maturi et al.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erick Rekstad whose telephone number is 703-305-5543. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Kelley can be reached on 703-305-4856. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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